BAE SYSTEMS

Monday July 28th, 2003

To whom it may concern,

This letter is to acknowledge that I have evaluated Thin Film Interconnect Devices fabricated by UltraSource, Inc. of Hollis, NH.

I agree that the process approach used to fabricate these devices is unique to the industry and that these devices offer a new and unique competitive solution to other multilayer thin film techniques such as 'air bridges' or 'polyimide supported air bridges'.

I have tested and evaluated the results of an UltraSource fabricated Lange Coupler with 'UnderBridges' and found that this technical solution performs similarly when compared to the polyimide supported air bridge approach from another supplier.

I believe that the process approach used by UltraSource may offer some unique advantages to the users of Thin Film Interconnect Devices that have not been previously realized.

Sincerely,

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Non-Obviousness Based on Independent Laboratory Analysis

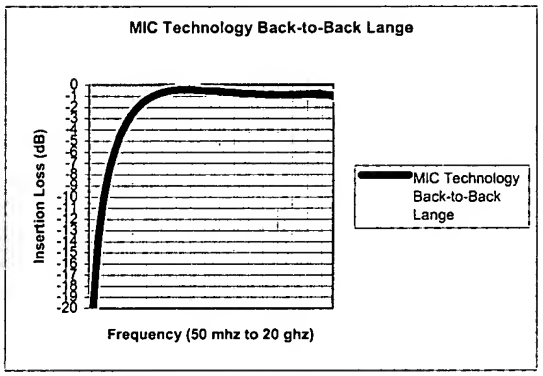
Applicants submit the attached 6-page report entitled "Lange Coupler Product Development Design Report" created by Microwave Packaging Technology, Inc. which states in part

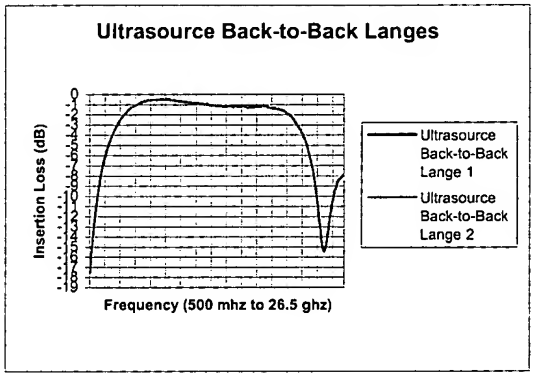
> "The Coupler will use the Ultra Source under bridge technology which is a market differentiating thin film process. It allows for interconnects in very fine geometries. The benefit of this process for the coupler is that it will eliminate the need for very tough wire bonding on small pads. This is a big advantage for most users since wire bonds on Lange Couplers are a frequent source of failure."

Clearly, the performance data provided in this report along with the statements by the research staff provide ample evidence to overcome a § 103 rejection by the Examiner. Taylor makes no attempt to address reliability issues associated with thin film technology as taught by the Applicants' invention disclosure. Drastically improved reliability with associated excellent electrical performance characteristics and a market differentiating thin film process are sufficient to overcome the Examiner's § 103 rejection based on the Taylor art.

Non-Obviousness Based on Performance Data

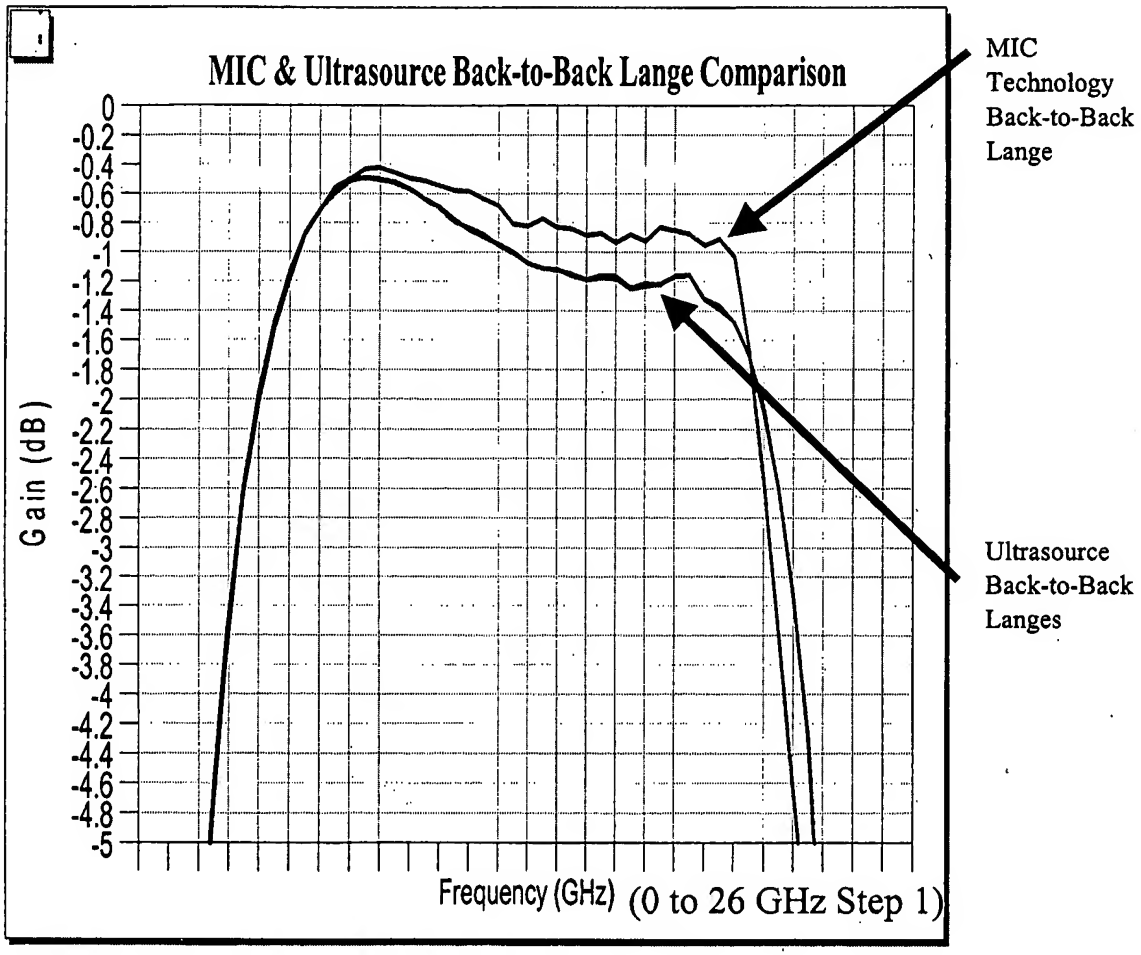
Applicants also note that test performance data indicates that the disclosed invention possesses competitive performance data to the prior art but at the same time providing (a) reduced cost of fabrication, and (b) greater ease of manufacturability. The following graphs as provided by customer testing illustrates the similarity of performance of the present invention (right) with the prior art (left) when used in a Lange coupler application:





This similarity of performance would lead one skilled in the art to utilize the construction techique (or fabrication structure) that produces the highest yield, lowest cost of manufacture, and highest reliability. However, conventional thin film fabrication techniques still utilize the MIC (left) technology, as compared to the structure taught by the Applicants' invention (right).

The following graph as provided by customer testing illustrates the similarity of performance of the present invention with the prior art when used in a back-to-back Lange coupler application:



Here it can be seen that the prior art MIC technology and the present invention (Ultrasource) have competitive and comparable performance characteristics. The major difference between the two is that the conventional prior art MIC technology has much lower yields, is difficult to fabricate, and has lower reliability than that exhibited by the present invention.

Given that the claimed structure is not currently in use within the thin film industry, this documentation supports the Applicants' assertion that the claimed structure is not obvious to one skilled in the art and as such may not be the subject of a § 103 rejection as posited by the Examiner. The improved reliability, ease of manufacturing, and higher yields would indicate that one skilled in the art would select the Applicants' structure as the preferred thin film technology if the Examiner's arguments of obviousness were valid. However, the structure taught by the Applicants is not currently used within the thin film industry, and as such represents a significant improvement over the prior art. The near identical performance of the Applicants' structure in this context strongly supports the Applicants' assertion that the claimed invention is not obvious in a § 103 context.

Non-Obviousness Based on Prior Art "Teaching Away"

Applicants would like to cite the textbook MATERIALS AND PROCESSES FOR MICROWAVE HYBRIDS by Richard Brown, ISBN 0-930815-31-9 (1989), pages 199-200 as an indication that the prior art actually teaches away from the structure and construction taught by the Applicants' present invention. Brown states in this text:

> **It is generally inadvisable to wire bond thin film capacitors as thin dielectrics have a tendency to crack during the bonding operation. Sometimes the top electrode is extended to provide a bonding area adjacent to the capacitor. The capacitor dielectric in this structure is also extended over the base electrode serving as an insulator between the two conductors. Thin film MIM capacitors fabricated this way (Figure 14.10a) have a tendency to short when thin dielectrics are used as insulation. The thin dielectric, typically 0.2 to 1.0 μm, may be stressed over the sharp edge of the bottom conductor and develop hairline cracks. When the top electrode is deposited it shorts through these cracks to the bottom conductor. An alternative is to bring the capacitor dielectric to the end of the bottom conductor, and interpose a thicker, flowable secondary insulator such as polyimide. The top electrode may then be processed, isolated from the base electrode by this redundant insulation (Figure 14.10c). This technique has the advantage of not having to process and perturb the bottom electrode until after the capacitor dielectric has been deposited and defined, maintaining the bottom electrode in an "as-deposited" state.**
>
> **The screening and firing of thick film dielectrics usually results in a tapered edge. The dielectric is also thick enough to cover any small defects in the base metallization so that the top conductor can safely bridge the bottom conductor without shorting (Figure 14.10b).**

This text teaches away from the use of the structure taught by the Applicants, as Brown states that "the thin dielectric, typically 0.2 to 1.0 um, may be stressed over the sharp edge of the bottom conductor and develop hairline cracks". This is illustrated in the Brown text in the following diagrams:

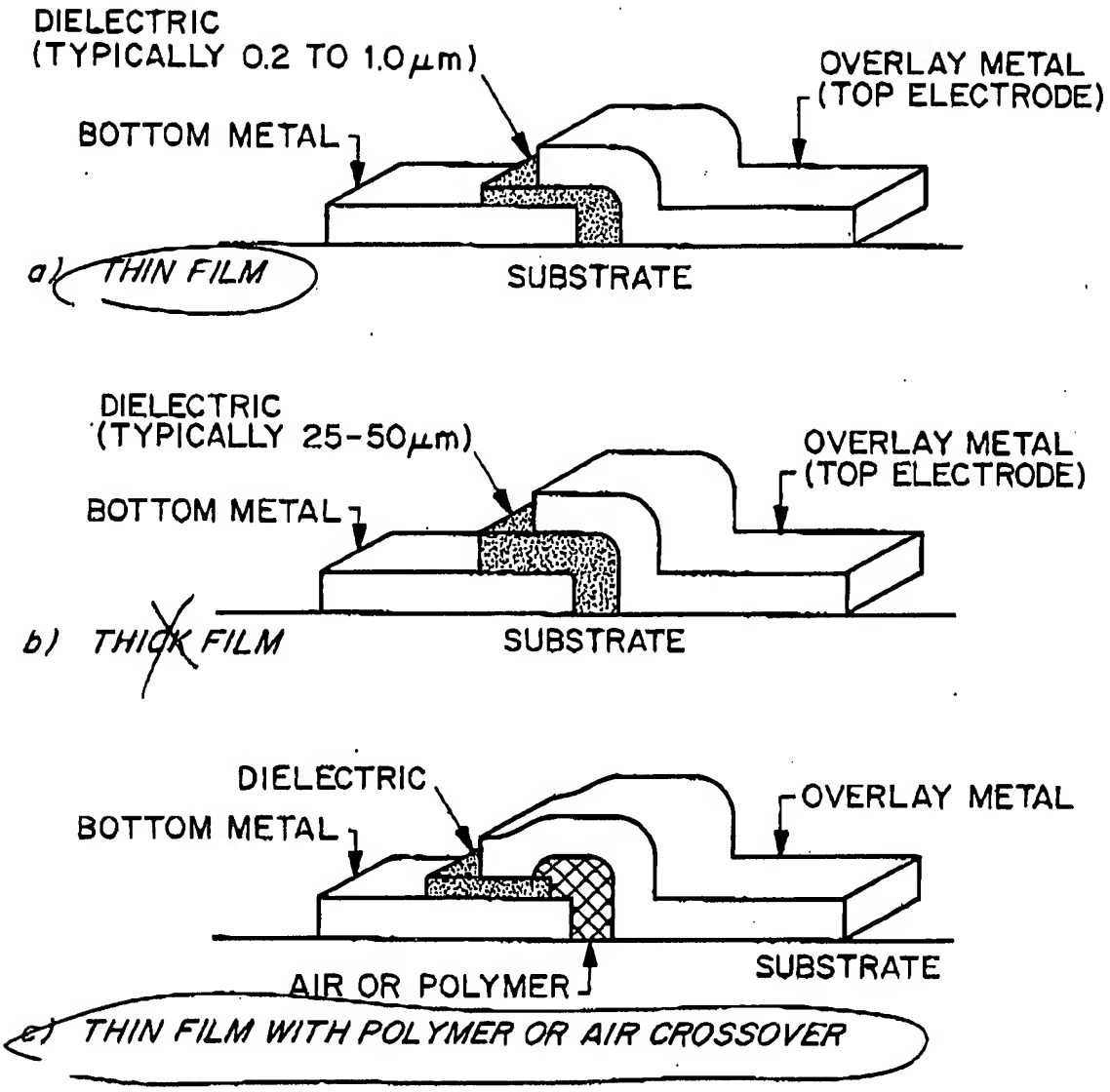


Figure 14.10. (a) Thin film parallel plate capacitor, (b) thick film capacitor, and (c) thin film capacitor with crossover.

Note here that the thick film structure illustrated in Figure 14.10(b) is limited in context to silkscreened structures and is not applicable to thin film structures. The structures in Figure 14.10(c) is typical of the prior art, and is difficult to fabricate, has low yields, and poor reliability.

Allowable Subject Matter

The Examiner's objection to Applicants' Claims has been overcome. All dependent Claims are now allowable as written, since they are dependent based on an allowable independent claims. See MPEP § 608.01(n)(III).

Request for Reconsideration

Applicants have placed the current patent appliation in a state believed to be suitable for allowance of all claims, and with all rejections/objections from the Examiner being fully addressed and rebutted.

Applicants respectfully request reconsideration of the Application based on the foregoing Amendment and Response. Applicants' attorney stands ready to assist the Examiner in any manner necessary to bring this patent application to allowance and encourages the Examiner to call if there are any questions or if any informal Examiner amendments can be made to bring this application to issuance.

Respectfully submitted,

5/31/2005

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